HURDLE FOR SPORT AND TRAINING USE

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Field of the Invention

This document concerns an invention relating generally to hurdles for use in sports, athletic training, and exercise and physical rehabilitation activities, and more specifically to hurdles of this nature which can at least partially give way when struck by users, and/or which are reconfigurable for varied use (e.g., to different hurdle heights) and/or for compact storage.

Background of the Invention

Hurdles are commonly used in track and field and other athletic events, as well as in physical fitness and athletic training/rehabilitation activities. A common hurdle takes the form of an upper horizontal crossbar having downwardly-extending struts at its ends, and having legs or bases mounted to the bottom of the struts so that the struts stand erect with the crossbar suspended above the ground. Users may then jump to try to clear the upper crossbar. A series of hurdles is often spaced along a raceway so that a user running along the raceway may attempt to clear the hurdles in the user's path while running.

However, such hurdles suffer from several disadvantages. Initially, while some hurdles are made to safely break away if their upper crossbars are struck by users when they attempt to clear the crossbars, those that do not have this break-away feature can cause injury. For example, hurdlers who catch or otherwise strike the crossbar may carry the hurdle along with them as they fall, and they may and land on top of the hurdle and experience enhanced injury.

Further, while hurdles are common pieces of exercise equipment, they are not used as often as they might otherwise be because they are generally bulky and difficult to transport and store. They occupy significant floor space in athletic storage facilities (and storage space in buses and athletic transport vehicles), and thus are generally disliked in comparison to more compact and transportable equipment. They are also time-consuming and inconvenient to set up and store; ordinarily, one who is setting up hurdles along a raceway can only carry one or two hurdles at a time owing to their bulk and weight. Because the hurdles are generally laid out over a substantial distance along the raceway, the installer faces the inconvenience of making multiple trips to obtain hurdles, walking them out to their set-up points and setting them up, and then walking back to the storage/distribution point to get more hurdles to be carried out to new set-up points. This can lead to long set-up times (and later break-down times) where many hurdles are used, which is a significant problem where the athletic field needs to be used for other purposes (e.g., where another sporting event is scheduled to occur after the hurdling event). There is a recognized need for means for rapid distribution and installation of hurdles; see, e.g., U.S. Patent 4,221,395 to *Carte*.

Summary of the Invention

The invention involves a hurdle which is intended to at least partially solve the aforementioned problems. To give the reader a basic understanding of some of the advantageous features of the invention, following is a brief summary of preferred versions of the hurdle. To assist understanding, reference is made to a particularly preferred version depicted in the accompanying drawings. As this is merely a summary of preferred versions of the hurdle, it should be understood that more details regarding the preferred versions may be found in the Detailed Description set forth elsewhere in this document. The claims set forth at the end of this document then define the various versions of the invention in which exclusive rights are secured.

A hurdle **100** (see generally **FIG. 1**) is provided with an at least substantially horizontal upper crossbar **102** having opposing bar ends, and spaced first and second struts **104** and **106** which descend from the crossbar **102** toward the ground, with these struts **104** and **106** preferably being at least substantially vertically oriented. At least one of the struts **104** and **106** then includes a lower support leg **110** extending outwardly from the strut at or near its bottom, with the support leg **110** having an outer leg end **114** opposite the strut from which it extends. The length of the support leg **110**, or at least its outer leg end **114**, may rest against the ground to maintain the struts **104** and **106** erect. Most preferably, only one of the struts **104** includes such a support leg **110**, and only the outer leg end **114** of the support leg **110** contacts the ground so that the hurdle **100** is effectively supported at three points (at the bottom ends of the struts **104** and **106** and at the outer leg end **114** of the support leg **110**) so that the hurdle **100** is stably supported in tripod-like fashion. One or more of the following features may then be incorporated for safety of use and/or ease of storage.

First, the support leg **110** may be made movable with respect to the crossbar **102** between a supporting state (**FIG. 1**) wherein the outer leg end **114** is situated out of a plane common to the first strut **104** and the crossbar **102** (with the support leg **110** thereby helping to support the hurdle **100** in an erect state), and a folded state (**FIG. 2**) wherein the outer leg end **114** is situated at least substantially within a plane common to the first strut **104** and the crossbar **102**. This arrangement is preferably provided by making the support leg **110** rotatable about the axis of the first strut **104**, as by providing a collar **120** at its end **112** opposite the outer leg end **114**, and having this collar **120** rotatably fit about the first strut **104**. The support leg **110** is preferably made resistant to rotation (or other motion) about the first strut **104** by providing an elastomeric member on the first strut **104** which bears against the support leg **110**, so that the support leg **110** frictionally resists motion between the folded and supporting states. This elastomeric member can take the form of an elastomeric ring **132** fit about the first strut **104**, and

which bears against the collar affixed to the support leg **110**. The collar **120** and elastomeric ring **132** can be closely fit between opposing stops **118** and **130** which radially protrude from the first strut **104**, and which urge the elastomeric ring **132** against the collar. By allowing the support leg **110** to move between the folded and supporting states, the hurdle **100** can be made to more readily yield if a user strikes or falls upon the crossbar **102**. Additionally, the hurdle **100** can be folded to a more convenient form for storage.

Second, the struts **104** and **106** may be made collapsible (compare **FIGS. 2** and **3**) so that they have variable length, i.e., so that the crossbar **102** of the hurdle **100** has variable height. This is preferably done by forming each strut of first and second strut members **104A** and **104B**, and **106A** and **106B**, which are adjacently situated in translatable relationship, whereby each strut **104** and **106** may be raised and lowered by translating its strut members **104A/104B** and **106A/106B** relative to each other. Such a translatable relationship may be provided by telescopically situating each second strut member **104B/106B** within its first strut member **104A/106A**, though other arrangements (e.g., forming the strut members **104A/104B** and **106A/106B** as adjacent slidable rails) are possible. A locking means is then preferably provided for locking the first and second strut members **104A/104B** and **106A/106B** together to provide desired strut lengths (and thus desired crossbar **102** heights); preferably, such locking means fix the strut members together at discretely spaced locations, e.g., at 10 cm increments, so that the crossbar **102** may be readily set to a variety of standard hurdle **100** heights (e.g., 50 cm, 60 cm, 70 cm, etc.). Additionally, such a locking means is preferably defeatable such that when a sufficient threshold force is applied to the crossbar **102** (e.g., when a user strikes or falls on the crossbar **102**), the strut members **104A/104B** and **106A/106B** will translate relative to each other to at least partially collapse the struts **104** and **106**. Conversely, the user may adjustably "snap" the struts **104** and **106**, and thus the crossbar **102**, to different desired heights with application of sufficient force. The locking means preferably takes

the form of a locking member **124** which extends from the first strut member **104A/106A** toward the second strut member **104B/106B**, and which extends into discretely spaced indentations **122** defined along the length of the second strut member **104B/106B** to engage it. The first strut member **104A/106A** may include a locking aperture **126** through which the locking member **124** extends, with the locking member **124** then extending into one of the indentations **122** in the second strut member **104B/106B**. The locking member **124** is preferably elastically biased from the first strut member **104A/106A** into one of the indentations **122** of the second strut member **104B/106B** such that the locking member **124** will disengage from the indentation **122** if sufficient force is applied to defeat the elastic biasing force. The elastic biasing may be implemented by an elastic band **128** (such as a helical spring formed as a closed loop) affixed to the locking member **124** and about the first strut member **104A/106A**. Most preferably, the locking member **124** is provided as a tube through which the elastic band **128** extends, with the elastic band **128** extending about the first strut member **104A/106A** and urging the tubular locking member **124** through a slot-like locking aperture **126** in the first strut member **104A/106A**, and then into a semicylindrical slot-like indentation **122** in the second strut member **104B/106B**. The curved surface of the tubular locking member **124** is then displaceable from the indentation **122** in the second strut member **104B/106B** when a sufficient threshold force is applied that the elasticity of the elastic band **128** is defeated.

For ease of use and storage, the hurdle **100** may also include a collection handle **150** (**FIG. 4**) which allows one or more of the hurdles **100** to be easily collected and carried. A handle aperture **134** may extend through the crossbar **102** at a location between its ends, and a collection handle **150** having a shaft **152** sized to extend through the handle aperture **134** may then be provided. Where multiple hurdles **100** are used, they may be collected on the same collection handle **150** by extending the shaft **152** of the collection handle **150** through the aligned handle apertures **134** of adjacently-situated hurdles **100** (which are preferably fully collapsed prior to collection by placing their

support legs **110** in the folded state, as in **FIG. 2**, and shortening their struts **104** and **106**, as in **FIG. 3**). So that the hurdles **100** collected on the collection handle **150** do not readily fall off, the shaft **152** of the collection handle **150** preferably includes a first end **154** sized such that it cannot extend through the handle aperture **134** (e.g., by bending it out of coaxial alignment with the remainder of the shaft **152**), and a second end **156** which is ordinarily sized to extend through the handle aperture **134**, but which is reconfigurable to a size that cannot extend through the handle aperture **134**. In the exemplary collection handle **150** of **FIG. 4**, this is done by extending a length of flexible tubing **158** from the first end **154** of the shaft **152** such that after the hurdles **100** are collected on the shaft **152** by inserting the second end **156** of the shaft **152** through their handle apertures **134**, the tubing **158** can be extended from the first end **154** of the shaft **152** to fit about the second end **156**, thereby forming the collection handle **150** into a closed loop.

Further advantages, features, and objects of the invention will be apparent from the following detailed description of the invention in conjunction with the associated drawings.

Brief Description of the Drawings

FIG. 1 is a perspective view of a hurdle **100** exemplifying the invention, shown erect with its support leg **110** situated in a supporting state.

FIG. 2 depicts the hurdle **100** of **FIG. 1** with its support leg **110** in the folded state.

FIG. 3 depicts the hurdle **100** of **FIG. 2** with its struts **104** and **106** collapsed, thereby decreasing the height of the crossbar **102**.

FIG. 4 is a view of several hurdles **100** in the collapsed state of **FIG. 3**, with the hurdles **100** being collected with their handle apertures **134** aligned so that a collection handle **150** may be inserted therein to allow easy collection, transport, and distribution of the multiple hurdles **100**.

Detailed Description of Preferred Versions of the Invention

Referring initially to **FIG. 1**, an exemplary preferred version of a hurdle is designated generally by the reference numeral **100**. The hurdle **100** includes an upper crossbar **102**, a first strut **104** descending from one of the ends of the crossbar **102** (with this first strut including a first strut member **104A** which telescopically receives a second strut member **104B**), an opposing parallel second strut **106** (which similarly includes a first strut member **106A** and a second strut member **106B**), a lower crossbeam **108** bridging the first and second struts **104** and **106**, and a lower support leg **110** having an inner leg end **112** affixed to the first strut **104** and an outer leg end **114** at its opposing end. The crossbar **102**, first and second struts **104** and **106**, crossbeam **108**, and support leg **110** are preferably all formed of lightweight materials, and may be readily constructed from plastic pipe (e.g., furniture-grade PVC tubing, which has fillers omitted during its manufacture to avoid the brittleness of common PVC tubing). This allows the connections between the various components to be readily made with common corner and T-connector pipe fittings, with the crossbar **102** being connected to the second strut members **104B** and **106B** by corner connectors **116**, the crossbeam **108** and the first strut members **104A** and **106A** being connected by T-connectors **118**, and the support leg **110** being connected to the first strut member **104A** of the first strut **104** by a T-connector **120**. The corners **116** are preferably firmly affixed to the crossbar **102** and the second strut members **104B** and **106B** by use of a strong friction-fit and/or by adhesives or other means of attachment, and the T-connectors **118** similarly firmly attach the crossbeam **108** to the first strut members **104A** and **106A**. However, the T-connector **120**, while preferably being firmly affixed to the support leg **110**, preferably has its through-hole portion (at the top of the T) rotatably fit about the first strut member **104A**, thereby allowing the support leg **110** to rotate about the first strut member **104A** (between, for example, the positions shown in **FIGS. 1-2**). Thus, the support leg **110** can be rotated into coplanar relationship with the crossbar **102**, the first and second struts **104** and **106**,

and the crossbeam **108** (as illustrated in **FIG. 2**) so that the hurdle **100** will not readily stay erect, while alternatively the support leg **110** may be rotated out of the aforementioned plane (as shown in **FIG. 1**) so that its outer leg end **114** forms a three-point support base (along with the lower ends of the first and second struts **104** and **106**) to maintain the hurdle **100** erect. Additionally, the size of the tubing chosen for the first strut members **104A** and **106A** and the second strut members **104B** and **106B** is preferably chosen such that the second strut members **104B** and **106B** closely fit within the first strut members **104A** and **106A**, but are capable of sliding to different locations therein, thereby allowing extension and retraction of the second strut members **104B** and **106B** within the first strut members **104A** and **106A** (and allowing the height of the crossbar **102** to be increased or decreased as desired, compare **FIGS. 2-3**).

So that the crossbar **102** of the hurdle **100** may be readily set to and maintained at different heights as desired, but at the same time may still be readily collapsed for ease of storage (and also so that the crossbar **102** readily yields if a user should, for example, strike or fall upon the crossbar **102**), it is useful to provide some form of locking means for resiliently (but defeatably) maintaining the crossbar **102** at desired heights. While a simple frictional fit between the first strut members **104A** and **106A** and the second strut members **104B** and **106B** would provide an operational hurdle **100**, such a frictional fit might degrade over time and/or in different temperature/moisture conditions, leading to inconvenience in setting the height of the hurdle **100** as desired. Thus, a particularly preferred arrangement is to provide locking means which defeatably lock the first and second strut members **104A/104B** and **106A/106B** at discretely spaced locations. In the exemplary hurdle **100**, this is done by defining indentations **122** (e.g., semicylindrical notches) in the surfaces of the second strut members **104B** and **106B** at regular increments along their lengths (e.g., at every 10 centimeters), and then providing a locking member **124** on each of the first strut members **104A** and **106A** which extends toward the second strut members **104B** and **106B** to engage any adjacent indentation **122** therein. Each

locking member **124** is elastically biased toward the second strut members **104B** and **106B** such that the locking member **124** will engage an indentation **122** when it is encountered, but at the same time the elastic biasing force may be defeated with the application of a sufficient threshold force, allowing readjustment of height. In the hurdle **100**, each locking member **124** – which may be formed by a short length of rigid tube – fits within a slot-like locking aperture **126** defined in the first strut members **104A** and **106A** (with this locking aperture **126** being situated adjacent the array of indentations **122** on the second strut members **104B** and **106B**). The locking member **124** is then elastically biased into the locking aperture **126**, and thus onto the surface of the second strut members **104B** and **106B** (and into the indentations **122**) by an elastic band **128** which fits through the locking member **124** and extends about the first strut members **104A** and **106A**. Such an elastic band **128** may take the form of a helical spring with its length looped into a ring-like shape, and with its ends held fixed within the interior of the locking member **124**; alternatively, this elastic band **128** may take other forms, such as a length of elastomeric material (e.g., an O-ring like structure, or a length of elastic cord over which the locking member **124** is fit and having its ends tied together). The tension in the elastic band **128** will tend to urge the locking member **124** into the locking aperture **126** so that the locking member **124** will ride along the surface of the second strut members **104B** and **106B**, and will be urged into the indentations **122** when encountered. However, at the same time, when the crossbar **102** is urged toward or away from the crossbeam **108** with sufficient force, the locking member **124** will be urged out of any indentation **122** wherein it may be resting, allowing the second strut members **104B** and **106B** to slide within the first strut members **104A** and **106A** until another indentation **122** is encountered. Since a cylindrical tubular locking member **124** will situate a curved surface – a portion of its circumference – within the semicylindrical indentations **122**, it will more readily disengage from an indentation **122** via a camming action than if it had surfaces shaped to cause greater interference with the indentations **122**. In this manner,

the crossbar **102** can be set to different heights, with the struts **104** and **106** "snapping" to different discrete heights during height variation.

As previously noted, the support leg **110** may be movable with respect to the crossbar **102** between the supporting state (**FIG. 1**) wherein the outer leg end **114** is situated out of a plane common to the remainder of the hurdle **100** (with the support leg **110** thereby helping to support the hurdle **100** in an erect state), and a folded state (**FIG. 2**) wherein the outer leg end **114** is situated at least substantially within the plane defined by the remainder of the hurdle **100**. The T-connector **120** at the inner leg end **112** of the support leg **110** defines a collar rotatably fit about the first strut member **104A** of the first strut **104**. To assist in making the collar/T-connector **120** resistant to rotation about the first strut **104** except when such rotation is desired, it is useful to provide some means for frictionally resisting such rotation. A preferred arrangement is to closely situate the collar/T-connector **120** closely between the T-connector **118** and an endcap **130** provided at the bottom of the first strut **104** (on the first strut member **104A**). The T-connector **118** and endcap **130** thereby serve as stops which radially protrude from the first strut member **104A** to prevent significant translation of the collar/T-connector **120** about the first strut member **104A**, and which may frictionally bear against the collar/T-connector **120** to hinder its rotation except when desired. More preferably, one or more elastomeric rings **132** are fit about the first strut member **104A**, and are sandwiched between the collar/T-connector **120** and the endcap **130** (and/or the T-connector **118**), so that the endcap **130** and/or T-connector **118** urge the elastomeric ring **132** against the collar/T-connector **120** so that the support leg **110** frictionally resists motion between the folded and supporting states.

It is therefore seen that the hurdle **100** can be converted between its supporting state with the crossbar **102** raised to a desired height (e.g., as in **FIG. 1**), to a folded state wherein the crossbar **102** is lowered (as in **FIG. 3**) for easy transport and storage. To assist in transport and storage, it is also useful to include one or more collection handles

150 (as depicted in **FIG. 4**) to allow one or more hurdles **100** to be easily collected and carried. A handle aperture **134** is defined somewhere on the hurdle **100**, preferably in the center of the crossbar **102** with the axis of the handle aperture **134** oriented generally perpendicular to the plane of the hurdle **100** when in its folded state. The collection handle **150** is then provided with a shaft **152** sized to extend through the handle aperture **134**, such that the shaft **152** may be extended through the handle apertures **134** of multiple hurdles **100** whose handle apertures **134** are situated in aligned relationship (see **FIG. 4**). So that the hurdles **100** may be maintained on the collection handle **150** so that they do not readily slide off of it, the shaft **152** of the collection handle **150** is preferably provided with a first end **154** sized such that it cannot extend through the handle aperture **134**. Such an arrangement is provided in the exemplary collection handle **150** of **FIG. 4** by bending the first end **154** out of coaxial alignment with the remainder of the shaft **152**. The shaft is then preferably provided with a second end **156** which is ordinarily sized to fit through the handle aperture **134**, but which is reconfigurable to a size such that it cannot extend through the handle aperture **134**. In the version of the hurdle **100** depicted in **FIG. 4**, this is simply achieved by affixing a length of flexible tubing **158** to the first end **154** of the collection handle **150**, with such tubing being bendable to allow its open end to fit about the second end **156** of the collection handle **150** to form the collection handle **150** into a closed loop from which the collected hurdles **100** may not easily fall. Once the loop of the collection handle **150** is closed, a user may grasp the tubing **158** (or any other portion of the collection handle **150**) and carry the collected hurdles **100** from one location to another.

Thus far, preferred versions of the invention have been discussed to illustrate different possible features of the invention and the varying ways in which these features may be combined. Other modifications are also considered to be within the scope of the invention. Following is an exemplary list of such modifications.

First, the various components of the hurdle **100** need not be made of tubing, and solid rods, solid or hollow rectangular beams, or other types of structural members may be used. Additionally, some components may be formed integrally (e.g., the crossbar **102** and the second strut members **104B/106B**), or alternatively of assemblies of subcomponents.

Second, the ability of the first and second struts **104** and **106** to extend and retract may be realized by use of arrangements other than by forming them of telescoping first and second strut members **104A/106A** and **104B/106B**. As an example, they may be formed of adjacently-situated members rather than telescopically interfit members, with such members being maintained in adjacent translatable relationship by use of clips, collars, or other guides.

Third, the locking means may take a number of forms different from those noted above. As one example, the elastic band **128** might be omitted from the locking member **124**, and the locking member **124** could be permanently affixed to its first strut member **104A/106A** by a leaf spring or other biasing structure which biases the locking member **124** toward the second strut member **104B/106B**. As another example, the second strut members **104B** and **106B** might include locking members **124** elastically biased radially outwardly (by a spring or the like), such that they remain depressed until they encounter the locking aperture **126** in the first strut member **104A/106A**. The locking member **124** may then pop outwardly through the locking aperture **126** to fix the strut members **104A/104B** and **106A/106B** together until the locking member **124** is pushed inwardly with a user's fingers, or until sufficient force is applied between the first and second strut members **104A/104B** and **106A/106B**. However, the locking means described previously is preferred because its structure is simple, inexpensive, readily replaceable, and requires no hand actuation, and it allows a firm (but defeatable) connection between the strut members.

Fourth, the support leg **110** (or support legs **110**, if more than one are provided) may be made movable by arrangements other than those described, such as by hinging it to its strut **104** and/or **106** so that it may swing about planes other than ones perpendicular to the struts **104** and **106** (for example, by swinging from a folded position parallel and adjacent to the first strut **104** to the support position shown in **FIG. 1**). However, the arrangement described above is preferred because it need not require any locking or fixing mechanism to hold the support leg **110** in its support position.

Fifth, it should be understood that the invention encompasses hurdles **100** which include some, but not all, of the features noted above (for example, a hurdle **100** having a crossbar **102** with adjustable height but lacking a movable support leg **110**, or conversely a hurdle **100** having a movable support leg **110** but lacking an adjustable crossbar **102**).

Sixth, collection handles **150** having structures different from the one described above may be used. As an example, the collection handle **150** may be formed entirely out of rigid material (i.e., the tubing **158** may be omitted), with the shaft **152** having a pivotable connection along its length so that its second end **156** may (after being inserted through the handle apertures **134** of the hurdles **100**) be folded out of coaxial relationship with the length of the shaft **152**, to abut and join to the first end **154** (which may have a hook defined thereon to close the loop of the collection handle **150** in a manner similar to a safety pin). As another alternative, the tubing **158** may be omitted and the second end **156** of the shaft **152** may bear an aperture for the insertion of a cotter pin or another blocking structure which prevents hurdles **100** from sliding off of the shaft **152** once installed thereon.

The invention is not intended to be limited to the preferred versions of the invention described above, but rather is intended to be limited only by the claims set out below. Thus, the invention encompasses all different versions that fall literally or equivalently within the scope of these claims.